

WHAT IS CLAIMED IS:

1. A suspended substrate coupler comprising:
  - a housing;
  - a dielectric substrate suspended in said housing, said substrate having a topside and a bottom side;
  - a first transmission line disposed on said topside of said substrate;
  - a second transmission line disposed on said bottom side of said substrate; and
  - means for capacitively coupling said first and second transmission lines to improve mode velocity matching in said coupler.
  
2. The coupler of claim 1, wherein said means for capacitively coupling said first and second transmission lines comprises:
  - a first plurality of spaced stubs disposed along and extending from first and second sides of said first transmission line;
  - a second plurality of spaced stubs disposed along and extending from first and second sides of said second transmission line;
  - a first plurality of ground stubs disposed on said bottom side of said substrate, each of said stubs being aligned with a corresponding one of said spaced stubs in said first transmission line on said topside of said substrate, whereby said first plurality of spaced stubs and said first plurality of said grounded stubs form a first plurality of coupling capacitors for said first transmission line; and
  - a second plurality of grounded stubs disposed on said topside of said substrate, each of said stubs being aligned with a corresponding one of said spaced stubs in said

second transmission line on said bottom side of said substrate, whereby said second plurality of spaced stubs and said second plurality of said grounded stubs form a second plurality of coupling capacitors for said second transmission line.

3. The coupler of claim 2, wherein said housing is electrically conductive and each of said ground stubs is electrically grounded to said housing.

4. The coupler of claim 1, wherein said housing includes a floor and a top cover and said substrate is mounted on a ledge in said housing such that a first cavity is formed between said topside of said substrate and said cover, and a second cavity is formed between said bottom side of said substrate and said floor of said housing

5. The coupler of claim 1, further including an input port and an output port with said first transmission line being connected to said ports with first and second microstrip interfaces, respectively, each of said interfaces being disposed on said topside of said substrate.

6. The coupler of claim 5, wherein said first and second microstrip interfaces and said first transmission line are incorporated in a single metallization disposed on said topside of said substrate.

7. The coupler of claim 5, further including an isolation port and a coupled output port connected to said second transmission line.

8. The coupler of claim 7, wherein said second transmission line is connected to said isolation port and said coupled output port with third and fourth microstrip interfaces, respectively, each of said interfaces being disposed on said topside of said substrate; and, first and second conductive vias in said substrate, respectively, that connect the top side of said substrate to the bottom side of said substrate.

9. The coupler of claim 8, wherein each of said microstrip interfaces further includes a matching stub.

10. A suspended substrate coupler comprising:  
an electrically conductive housing, said housing including a floor and a top cover;  
a dielectric substrate having a topside and a bottom side, said substrate being mounted on a ledge in said housing such that a first cavity is formed between said topside of said substrate and said cover, and a second cavity is formed between said bottom said of said substrate and said floor of said housing;  
a first transmission line disposed on said topside of said substrate, said first transmission line including a first plurality of spaced stubs disposed along and extending from first and second sides of said first transmission line section;  
a second transmission line disposed on said bottom side of said substrate, said second transmission line including a second plurality of spaced stubs disposed along and extending from first and second sides of said second transmission line;

a first plurality of ground stubs disposed on said bottom side of said substrate, each of said stubs being aligned with a corresponding one of said spaced stubs in said first transmission line on said topside of said substrate, whereby said first plurality of spaced stubs and said first plurality of said grounded stubs form a first plurality of coupling capacitors for said first transmission line; and

a second plurality of grounded stubs disposed on said topside of said substrate, each of said stubs being aligned with a corresponding one of said spaced stubs in said second transmission line on said bottom side of said substrate, whereby said second plurality of spaced stubs and said second plurality of said grounded stubs form a second plurality of coupling capacitors for said second transmission line.

11. The coupler of claim 10, further including an input port and an output port with said first transmission line being interfaced to said ports with first and second microstrip interfaces, respectively, each of said interfaces being disposed on said topside of said substrate.

12. The coupler of claim 11, wherein said first and second microstrip interfaces and said first transmission line are incorporated in a single metallization disposed on said topside of said substrate.

13. The coupler of claim 11, further including an isolation port and a coupled output port connected to said second transmission line section.

14. The coupler of claim 13, wherein said second transmission line is connected to said isolation port and said coupled output port with third and fourth microstrip interfaces, respectively, each of said interfaces being disposed on said topside of said substrate; and, first and second conductive vias in said substrate, respectively, that connect the top side of said substrate to the bottom side of said substrate.

15. The coupler of claim 14, wherein each of said microstrip interfaces further includes a matching stub.